

# QUEST

## ADVENTURES IN THE WORLD OF SCIENCE

### WEAPONS

8

#### FACT FILES ON:

- ▲ Anti-satellite weapons
- ▲ Crossbows
- ▲ Uranium and plutonium
- ▲ The nuclear age
- ▲ After the bomb
- ▲ Counter-attack
- ▲ Chemical and biological warfare
- ▲ Animals fight

#### MODEL:

#### CHALLENGER TANK

#### THREE PROJECTS

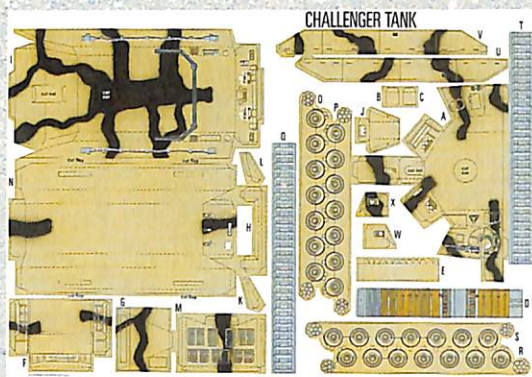
#### BALANCE OF POWER POSTER



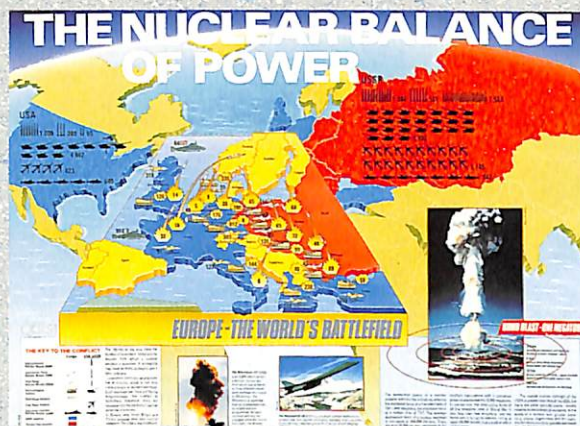
# INSIDE THIS PACK

## FACT FILES

- ▶ Countermeasures
- ▶ ASATs ▶ Nukes ▶ After the Bomb ▶ Chemical weapons ▶ Crossbows
- ▶ Plutonium ▶ Animal attack



**MODEL** Challenger Tank



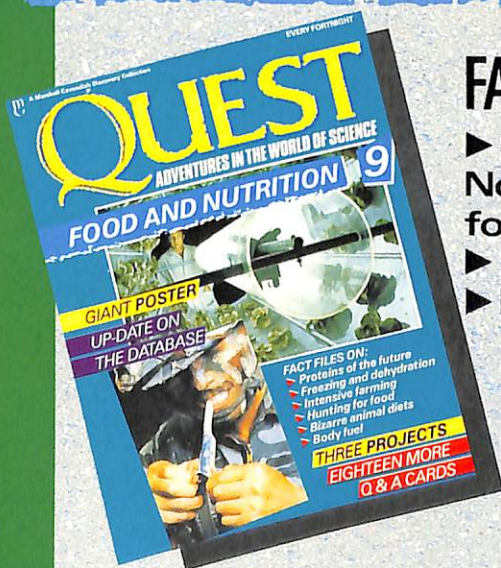
**POSTER** Balance of power

## PROJECTS

- Trajectories
- Make a rangefinder
- Camouflage like the SAS



## COMING IN QUEST 9 FOOD

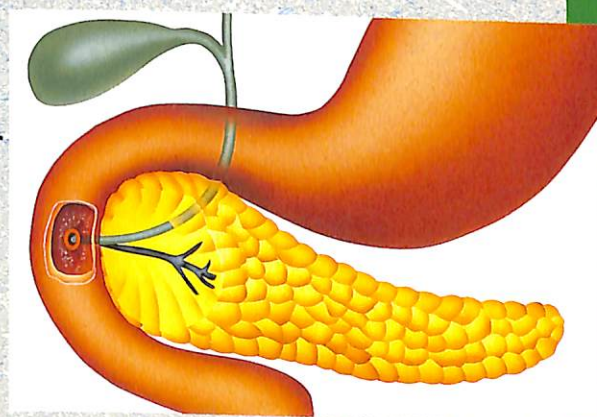
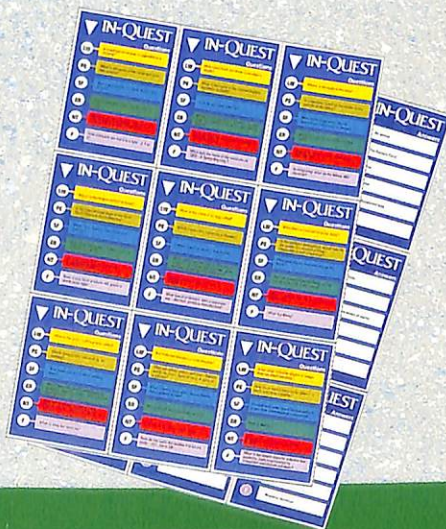


**PLUS**

**DataQuest update**

## FACT FILES INCLUDE

- ▶ Survival foods ▶ Farming Now ▶ Sci-fi food ▶ Wonder foods ▶ What animals eat
- ▶ Hi-tec supermarkets
- ▶ Imbalances



**POSTER** Digestive system

*In-Quest* question and answer cards

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# PROJECTS

## WEAPONS

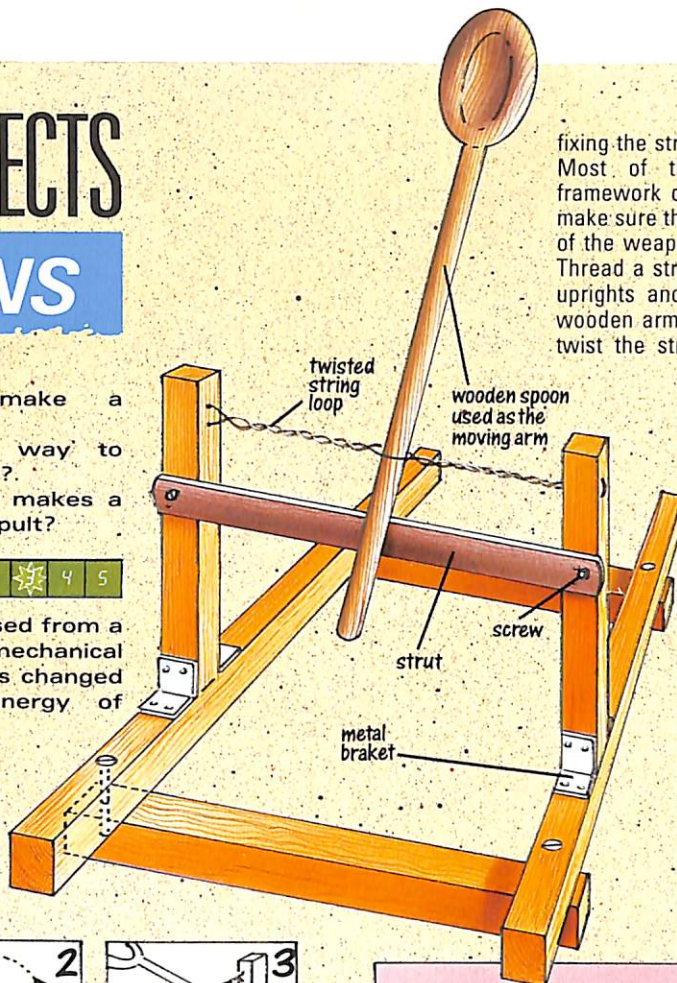
- How can you make a rangefinder?
- What is the best way to camouflage your body?
- What energy change makes a missile fly from a catapult?

### CATAPULT

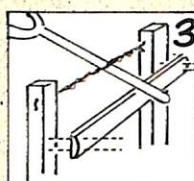
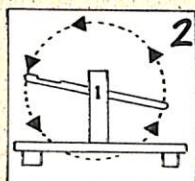
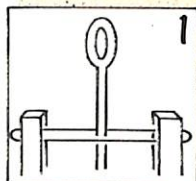
1 2 3 4 5

When a missile is released from a catapult, stored mechanical energy in the weapon is changed to kinetic energy (energy of motion) in the missile.

This model works on the same principle as some of the huge catapults used on battlefields centuries ago. Construct the framework as shown. Make the holes for



fixing the strut, but do not screw it in place yet. Most of the dimensions of the wooden framework of the catapult are not critical, but make sure that there is room for the moving arm of the weapon to be rotated in the framework. Thread a strong string through the holes in the uprights and tie it to form a loop. Insert the wooden arm through the loop (1) and turn it to twist the string (2). Continue turning the arm until the uprights of the framework start to bend inwards. Get someone to pull the uprights outwards while you screw the strut in place. The tension in the string will force the arm against the strut (3). Use some small lumps of plasticine as missiles. Pull the arm of the catapult back, place a missile in the bowl of the spoon, release the arm. The energy you use to tension the arm is stored in the twisted string. When you let go of the arm, this energy is released. It snaps the arm back against the strut, and the missile is hurled forward. If the string eventually becomes too slack, remove the strut, turn the arm a few times to tighten the string, then replace the strut.

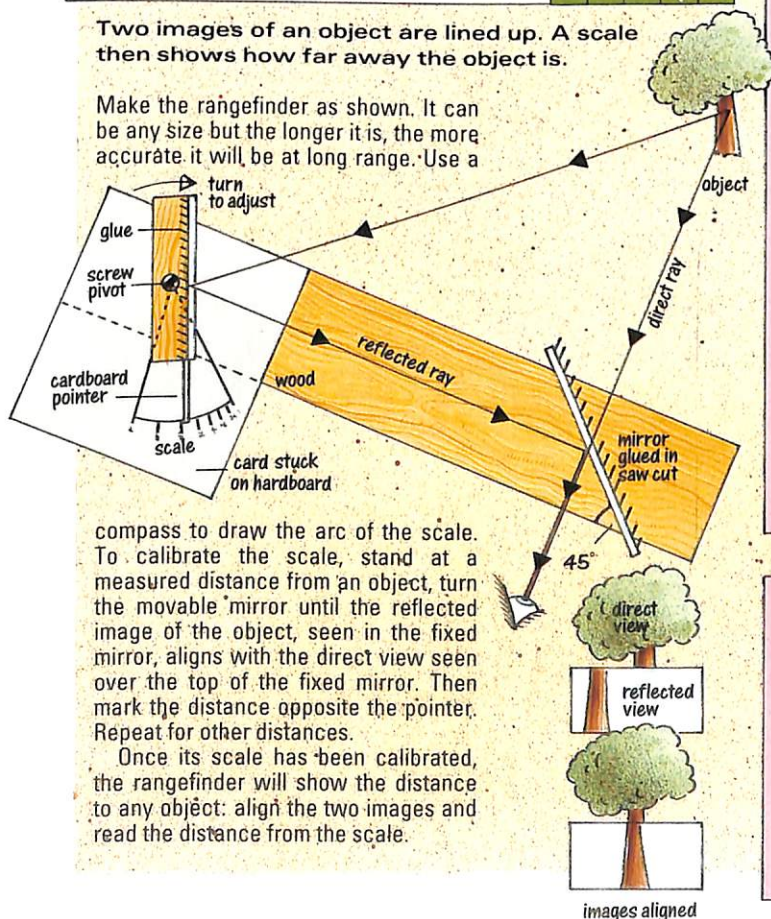


### MEASURING RANGE

1 2 3 4 5

Two images of an object are lined up. A scale then shows how far away the object is.

Make the rangefinder as shown. It can be any size but the longer it is, the more accurate it will be at long range. Use a



compass to draw the arc of the scale. To calibrate the scale, stand at a measured distance from an object, turn the movable mirror until the reflected image of the object, seen in the fixed mirror, aligns with the direct view seen over the top of the fixed mirror. Then mark the distance opposite the pointer. Repeat for other distances.

Once its scale has been calibrated, the rangefinder will show the distance to any object: align the two images and read the distance from the scale.

### CAMOUFLAGE

2 3 4 5

Effective camouflage is a lifesaver for troops in combat. See how well you can avoid detection by disguising and concealing your features.

Try this with a friend. Start with your faces. Get some camouflage cream from a military equipment supplier – alternatively, try some stage make up from a novelty shop. Mix it with saliva and rub it over your face. Next, add undiluted cream in wavy bands and then add more spit and blur it all together. Ensure your hands are covered with cream.

Wear old, dark clothing that covers arms and legs completely. Add foliage.

Now choose an area with tall grass or bushes and see how close you can get to each other before being spotted.



### PROJECT INFORMATION

Each **QUEST** project has been given its own difficulty rating: 1 very simple 2 simple 3 intermediate 4 advanced 5 complicated.

Parents should ensure that experiments involving sharp tools, water and electricity are supervised. The publisher can accept no responsibility for injury.

**WARNING!**





# MODEL CHALLENGER TANK

## ASSEMBLY INSTRUCTIONS

### You will need

Scissors • Ruler • Craft knife • Glue • Pin

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use dotted lines as a guide for positioning.

NB Younger children using a craft knife will need supervision.

### To make up

#### Turret

- 1 Cut out turret **A**. Use a craft knife to cut out areas indicated. Fold front and sides up to shape, but do not glue at this stage.
- 2 Cut out barrel supports **B**, **C**. Fold tabs and glue in position inside turret **A**. Cut out barrel **D**. Fold around a pencil to form a tube and glue to shape.
- 3 Push the barrel through the 'gunport' at the front of turret **A**, and position the end between barrel supports **B**, **C**. Push a small pin through the supports and barrel, and add a touch of glue to the end to hold the pin in place (see Fig. 1).
- 4 Cut out turret pivot **E**. Fold to form a ring, and glue to shape. Fold tabs down and apply glue to underside edges. Push turret pivot **E** through circular hole in turret **A** and stick tabs to inside edges.



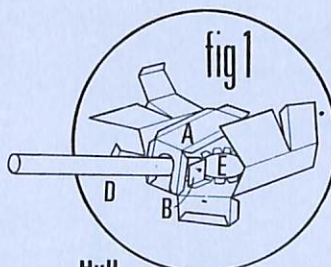
- 5 To complete turret **A**, fold sides up to form top and glue to shape. Fold front and front sides up, and keeping all tabs to underside edges glue to shape (see Fig. 1).

#### Ammunition store

- 1 Cut out ammunition store **F**. Fold sides and back up, and keeping all tabs to underside edges, glue to shape (see ASSEMBLY DIAGRAM). Cut out ammunition store **G**. Fold to shape and glue on to tabs of **F** to form top.

- 2 Cut out **H**. Fold tabs to shape, and apply glue to tabs at centre top and sides. Stick to underside front and sides of ammunition store **F** (see ASSEMBLY DIAGRAM).

- 3 Apply glue to remaining tabs on top, sides and bottom of **H**, tab on **G** and tabs on turret **A**. Keeping all tabs to underside edges, join **G/H** to turret **A**.



#### Hull

- 1 Cut out upper hull **I**. Fold sides and back down and glue to shape. Fold front down and glue tabs to inside edges of sides.
- 2 Cut out **J**. Fold back and sides up; glue tabs of back around sides to shape. Fold side tabs down. Push hatch through hole on **I**; keeping all tabs to underside edges, stick **J** in position.
- 3 Cut out armour supports **K**, **L**. Fold tabs to shape and glue to underside edges at front corners of upper hull **I**. Cut out engine grill **M**. Fold and glue to shape. Stick in position on upper hull **I**.
- 4 Cut out **N**. Cut flaps where indicated; push down. Fold sides and back up; glue to shape.
- 5 Apply glue to tabs on upper hull **I** and lower hull **N** and, keeping all tabs to underside edges, stick the two hull pieces together.

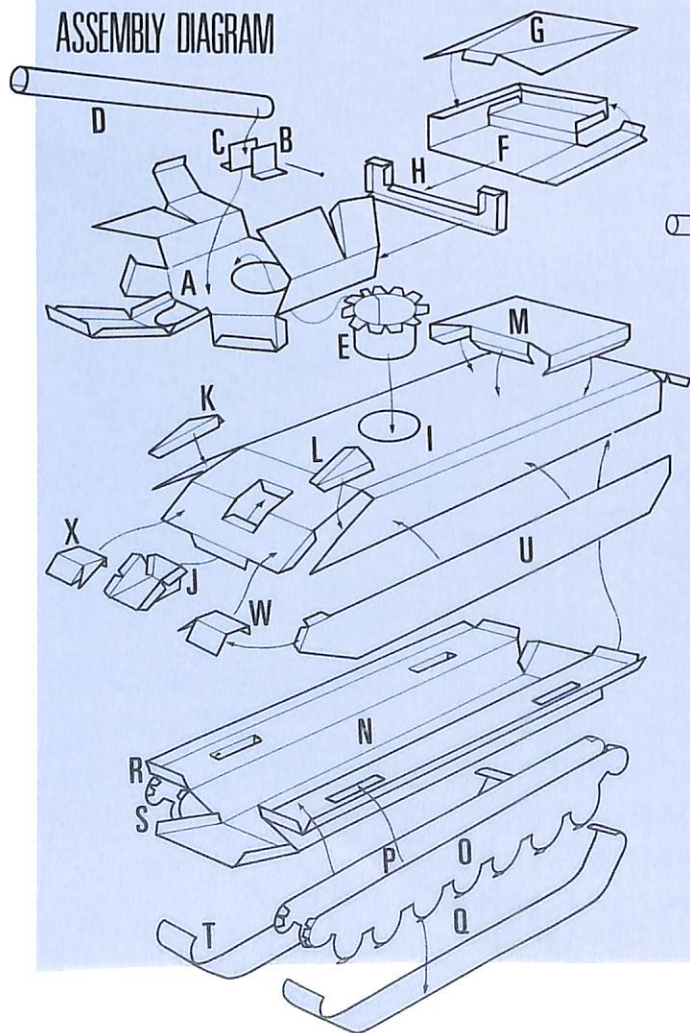
#### Wheels and track

- 1 Cut out wheels **O**, **P**. Fold tabs down. Cut out track **Q**. Glue tabs of wheels **O** to outside edge of track and tabs of **P** to inside edge.
- 2 Glue completed wheels and track **P** to outer edge of lower hull **N**, sticking inside edge of **O** to flaps on lower hull **N**.
- 3 Repeat with **R**, **S** and **T**. Glue to opposite side of **N**.

#### To finish

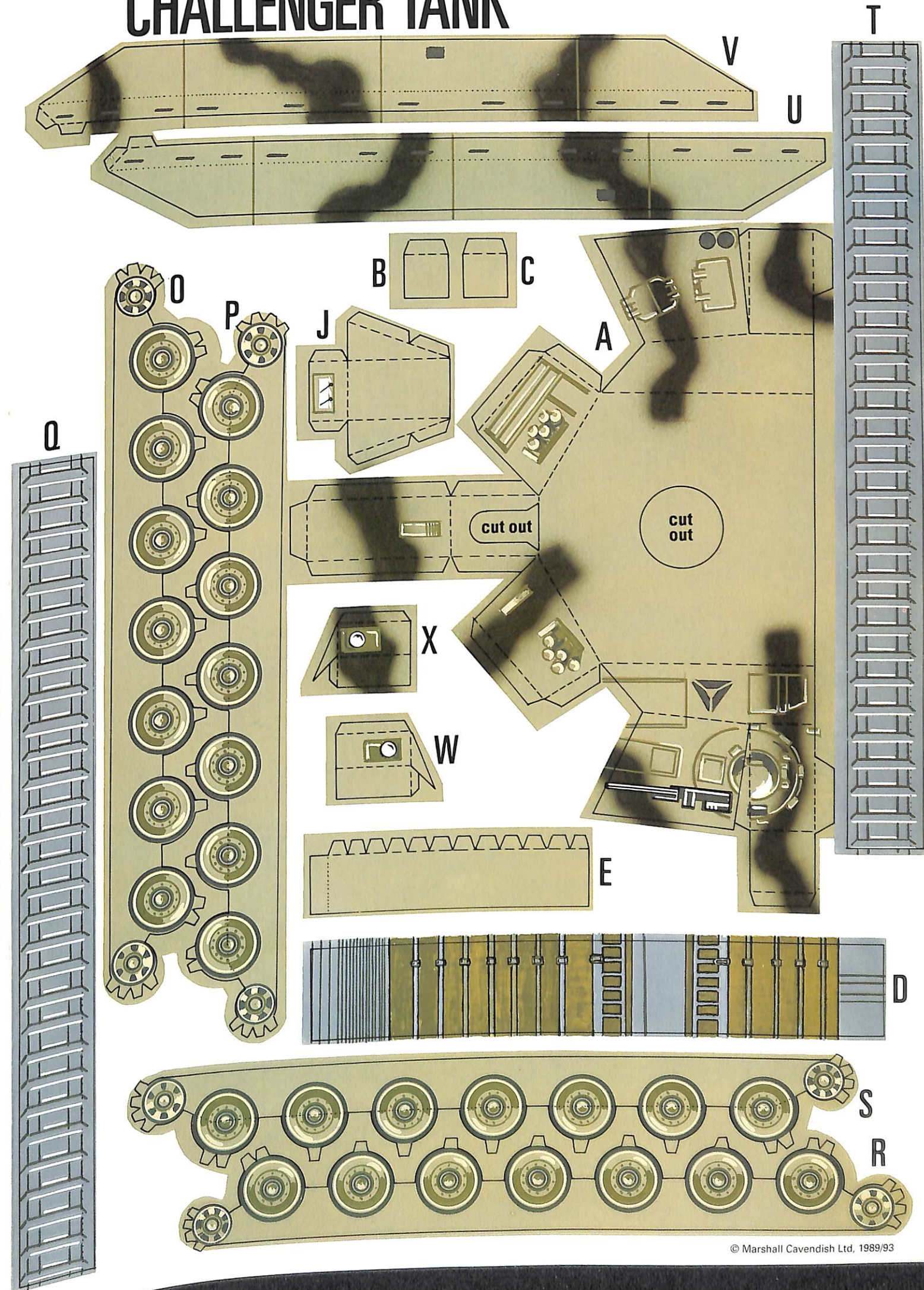
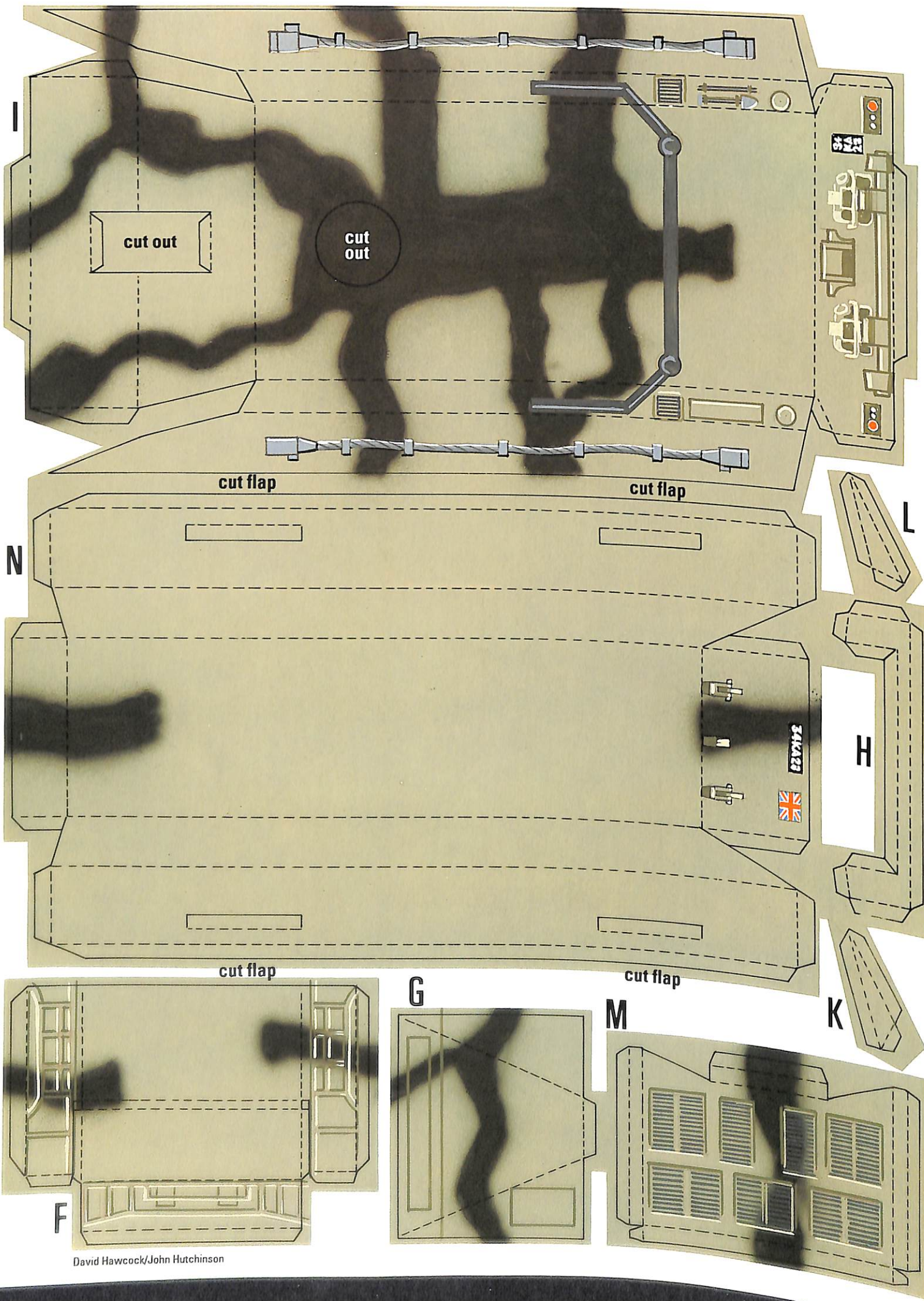
- 1 Cut out skirt **U**, **V**. Glue each piece to either side of **I**, sticking tabs around front of **I**. Cut out **W**, **X**. Fold and glue to shape. Glue into position on either side of front **I**.
- 2 To join the turret and hull, push turret pivot **E** into circle on upper hull **I**. The turret will turn and barrel can be raised and lowered.

### ASSEMBLY DIAGRAM

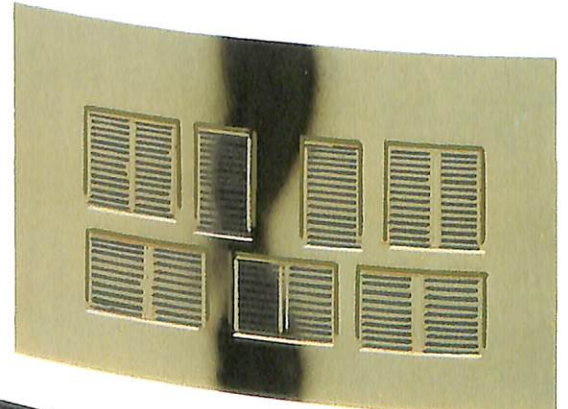
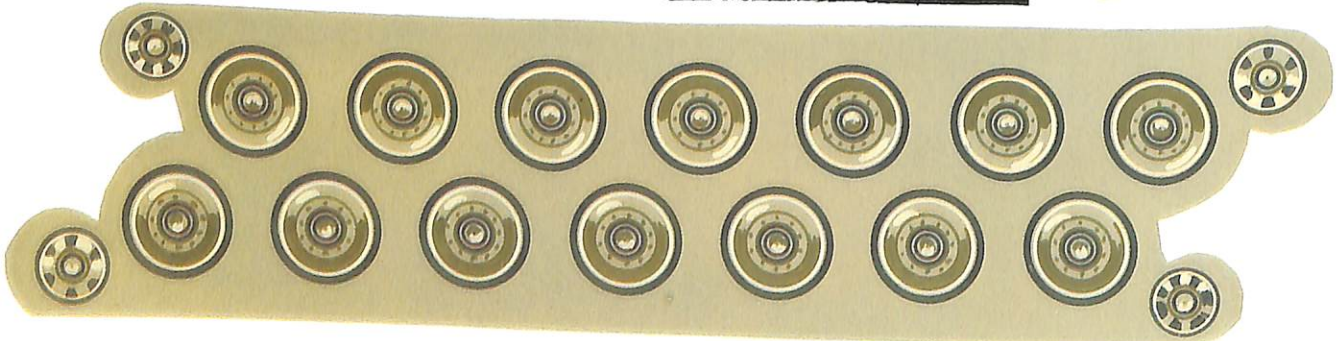
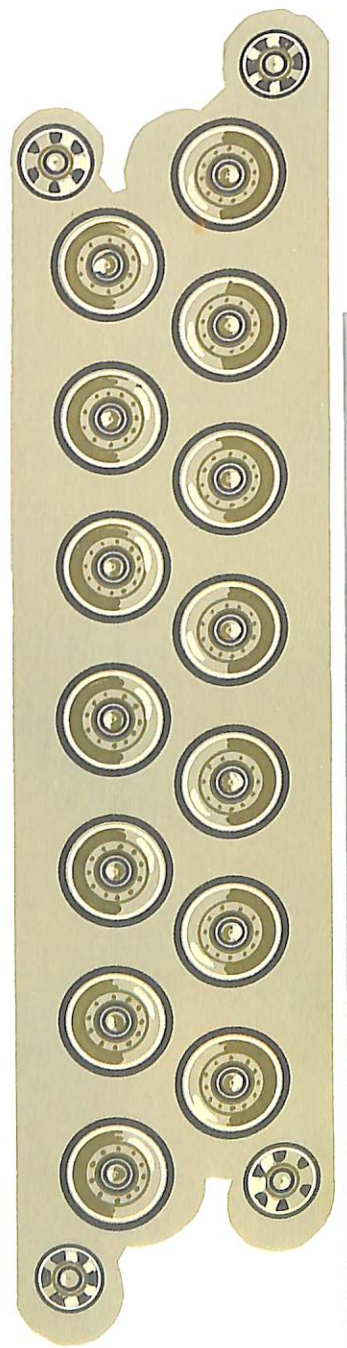
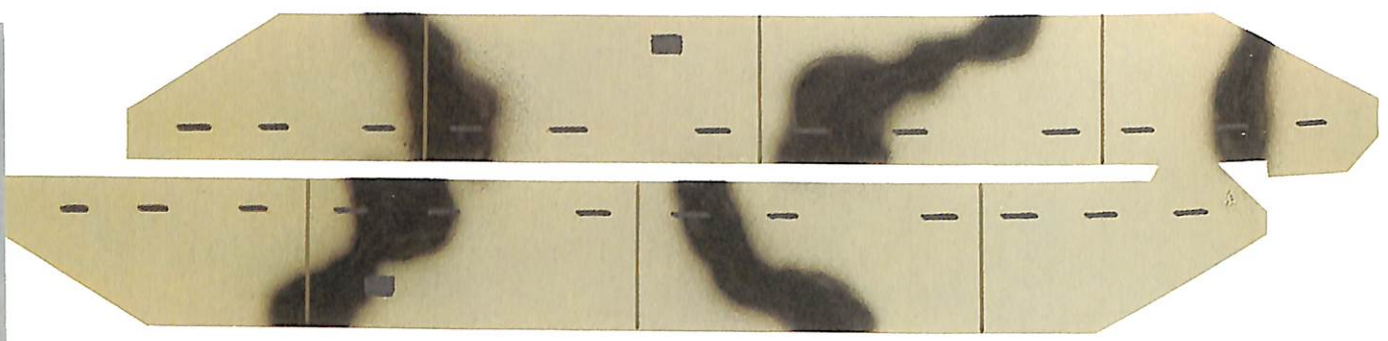
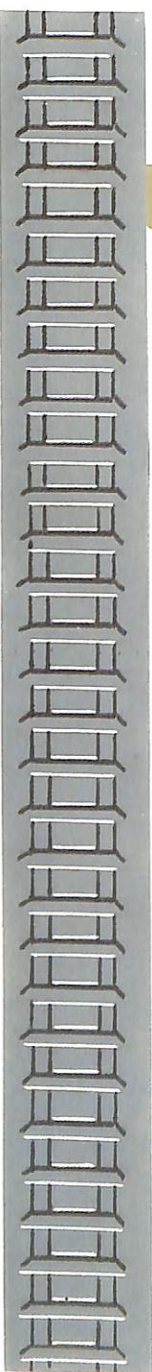




# CHALLENGER TANK









# THE NUCLEAR OF POWER



## COLD WAR WEAPONS

Intercontinental Ballistic Missile (ICBM)  
Intermediate Range Ballistic Missile (SRBM)  
Short Range Ballistic Missile (SRBM)  
Nuclear Capable Artillery  
Short Range Bombers  
Long Range Bombers  
Submarine Launched Ballistic Missile (SLBM)

Europe  
USA  
USSR

NATO countries with nuclear weapons on their soil  
Warsaw Pact countries with nuclear weapons on their soil  
Countries with no nuclear weapons

The Cold War was the period when the Communist and Capitalist nations of the industrialised world were openly hostile to each other. They spied on each other, supported opposing sides in various wars and continually tried to undermine each other. Both sides built up huge nuclear and conventional armories in case the Cold War ever become a hot war. The Cold War began after World War II as the victors disagreed over the future for Europe. It ended with the collapse of Communism in 1990. The map, above, shows the number of weapons deployed in 1989, at the very end of the Cold War. Within months, both Russia and the United States began withdrawing their nuclear weapons from Europe and destroying their arsenals.

## EUROPE-THE WORLD

### THE AFTERMATH

After the end of the Cold War and the collapse of Communism, large numbers of nuclear weapons became redundant. Most nuclear nations began a process of reducing their stockpiles, keeping only the most modern weapons as a minimal deterrent. Though the threat of war between the superpowers has reduced, the technology for nuclear war remains in place. Both the weapons shown here remain in service. Russia, Britain and France also retain nuclear weapons.

Gamma/Frank Spooner Pictures

TRH/USAF

Left: The Minuteman American ICBM carry a 335 kilotonne warhead within 300 metres of its designated target.



# AR BALANCE



## D'S BATTLEFIELD



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**Above: The Rockwell B-1B, an American long range bomber which can deliver 54 warheads to a variety of targets.**



## BALANCE OF TERROR

- 2.4 km**
  - almost all substances will vapourise
  - release of initial radiation - lethal
- 6 km**
  - almost all buildings devastated
  - flash burns right through skin
- 13 km**
  - many materials self ignite - causes firestorm
  - people in the open suffer severe burns
- 160 km**
  - people may be blinded by the first flash

Throughout the Cold War the nuclear weapons were used as a deterrent to dissuade a potential enemy from starting a war. The more terrifying the prospects of becoming a target, the more effective the deterrent factor. The most destructive use for a nuclear weapon was as an air burst over a city. The height of the blast ensured devastation was widely spread, while the

densely populated target would suffer huge loss of life.

A one megaton weapon exploded over a large city in daytime, when people are about, could cause over a million casualties. Likely effects on the ground are outlined above.

Early in the Cold War nuclear weapons could only be delivered by bomber aircraft. Efficient fighter defences largely cancelled

out the deterrent factor. Later, ICBMs could elude fighters and most anti-missile missiles. The USA was on the brink of developing effective anti-ICBM defences, the so-called Star Wars Initiative, when the Cold War came to an end. Fortunately the deterrent factor remained so high throughout the Cold War that no nation began hostilities and nuclear weapons were not used.